REMARKS

This is a response to the Official Action dated November 3, 2004. Reconsideration of the above-identified application in view of the preceding amendments and the following remarks is respectfully requested.

Claims 1, 12, 13 and 22 have been amended and claims 18-19 have been cancelled. Claims 1-17 and 20-22 are still pending in this application. No new matter is believed to have been added to the subject application by way of this amendment, nor have any new issues been raised.

The examiner has suggested that original claim 1 was not distinguished from Miller (743). In the Official Action, the Examiner rejected Claims 1-4, 6, 7, 9, 10, 12-14, 16, 17, 20-22 as being anticipated by Miller et al. (U.S. Patent No. 5,275,743) and stated as follows:

> Claims 1-4, 6, 7, 9, 10, 12-14, 16, 17, 20-22 are rejected under 35 U.S.C. 102 (b) as being anticipated by Miller ET al. (U.S. Patent No. 5,275,743).
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> Independent claim 1 recites, "a multi-layer downstream filtration media support" (line 5) and "said multi-layer downstream pleat support" (line 14). It is unclear whether the support is intended to claim a "pleat" structure. Since the base claim 1 in other instances and its dependent claim fail to recite such a recitation, claim 1 has been examined based on the first cited reference above for the support structure.
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> Miller (743) teaches a filter element (10), comprising a filtration media (22), an upstream filtration media support (21) positioned upstream from and in contact with said filtration media (22) and a multi-layer downstream filtration media support (23,24) positioned downstream from said filtration media (22), said multi-layer downstream support (23,24) including a first downstream support layer (23) and a second downstream support layer (24), wherein: said first downstream support layer (23) is in contact with said filtration media (22) and is interposed between said filtration media (22) and said second downstream layer (24). The first downstream support layer (23) is fabricated so as to minimize points of surface contact with said filtration media (22); and said second downstream support layer (24) is in contact with said first downstream support layer (23) and is fabricated so as to facilitate lateral

fluid flow relative to said multi-layer downstream media support (23, 24) as recited in claim 1. As to claim 2, Miller (743) discloses filter element wherein the filtration media is a pleated filtration media having a plurality of longitudinally extending pleats in column 8 lines 66-68. Miller (743) teaches the use of a pleated filtration media (column 2 lines 32-36) selected from the group consisting of radial pleats, w-pleats and spiral pleats (column 5 lines 28-31) as recited in claim 3. As to claim 4, Miller (743) describes a filter element as recited in Claim 1 in column 2 lines 58-64, wherein the filtration media is a microporous filtration membrane having a pore size of 10 microns or less. As to claim 6, Miller (743) describes, column 3 lines 58-63, the multi-layer downstream support consisting of said first downstream support layer and said second downstream support layer. Miller (743) also describes the first downstream support layer is fabricated from a nonwoven material in column 3 lines 61-63 as recited in claim 7. As to claim 9, Miller (743) states said nonwoven material is fabricated as a wetlaid material in column 2 line 17. Miller (743) also states said nonwoven material is fabricated from polyester in column 4 line 24, as recited in claim 10.

As to claim 12, Miller (743) teaches a filter element (10), comprising a filtration media (22), an upstream pleat support (21) positioned upstream from and in contact with said filtration media (22) and a multi-layer downstream pleat support (23,24) positioned downstream from said filtration media (22), said multi-layer downstream support (23,24) including a first downstream support layer (23) and a second downstream support layer (24), wherein said first downstream support layer (23) is in contact with said filtration media (22) and is interposed between said filtration media (22) and said second downstream layer (24). The first downstream support layer (23) is fabricated so as to minimize points of surface contact with said filtration media (22); and said second downstream support layer (24) is in contact with said first downstream support layer (23) and is fabricated so as to facilitate lateral fluid flow relative to said multi-layer downstream pleat support (23, 24).

As to claim 13, Miller (743) also teaches a filter cartridge comprising a filter element (10) having a longitudinal axis, an outer periphery and an inner periphery, and including a filtration media (22), an upstream filter media support (21) positioned upstream from and in contact with said filtration media (22); and a multi-layer downstream support (23,24)

positioned downstream from said filtration media (22), said multi-layer downstream support (23,24) including a first downstream support layer (23) and a second downstream support layer (24), wherein the first downstream support layer (23) is in contact with said filtration media (22) and is interposed between said filtration media (22) and said second downstream layer (24), said first downstream support layer (23) being fabricated so as to minimize points of surface contact with said filtration media (22). The second downstream support layer (24) is in contact with said first downstream support layer (23) and is fabricated so as to facilitate lateral fluid flow relative to said multi-layer downstream filter media support (23, 24); a perforated cage (11) surrounding the outer periphery of the filter element; a perforated core (12) surrounded by the inner periphery of the filter element; and end caps (13, 14) enclosing both ends of the perforated cage (11). Miller (743) also describes the first downstream support layer is fabricated from a nonwoven material in column 3 lines 61-63 as recited in claim 14. As to claim 16, Miller (743) states said nonwoven material is fabricated as a wetlaid material in column 2 line 17. Miller (743) also states said nonwoven material is fabricated from polyester in column 4 line 24, as recited in claim 17. As to claim 20, Miller (743) discloses in Figure 1 a perforated cage (11) is equipped with end caps (13, 14) at both ends thereof. As to claim 21, Miller (743) discloses in Figure 1 said perforated core (12) is a cylindrical core and is coaxially positioned within the filter element, which is a cylindrical filter element, and the cage (11) is likewise cylindrical and is coaxially positioned about the cylindrical filter element.

As to claim 22, Miller (743) also teaches a filter cartridge comprising a filter element (10) having a longitudinal axis, an outer periphery and an inner periphery, and including a filtration media (22), an upstream filter pleat support (21) positioned upstream from and in contact with said filtration media (22); and a multi-layer downstream support (23,24) positioned downstream from said filtration media (22), said multi-layer downstream support (23,24) including a first downstream support layer (23) and a second downstream support layer (24), wherein the first downstream support layer (23) is in contact with said filtration media (22) and is interposed between said filtration media (22) and said second downstream layer (24), said first downstream support layer (23) being fabricated so as to minimize points of surface contact with said filtration media (22). The second downstream support layer (24) is in contact with said first downstream support layer (23) and is fabricated

> so as to facilitate lateral fluid flow relative to said multi-layer downstream filter pleat support (23, 24); a perforated cage (11) surrounding the outer periphery of the filter element; a perforated core (12) surrounded by the inner periphery of the filter element; and end caps (13, 14) enclosing both ends of the perforated cage (11).

Applicants hereby traverse the Examiner's 35 U.S.C. §102 rejections and respectfully submit that all currently pending claims are patentably distinguishable over Miller et al. Concerning the 35 U.S.C. § 102(b) rejections, as the Examiner knows, MPEP §2131 provides:

> "A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described in a single prior art reference." *Verdegaal Bros. v. Union Oil Co. Of California,* 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). "The identical invention must be shown in as complete detail as contained in the ... claim." *Richardson v. Suzuki Motor Co.,* 868 F.2d 1226, 1236, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989). The elements must be arranged as required by the claim.

As stated by the Examiner, Miller et al. does not disclose all elements of any of the present independent claims of the above-referenced application, either explicitly or inherently. Specifically, Miller et al. is silent as to the **second downstream support layer being an extruded apertured element**. Miller (743) also does not teach the extruded layer having ribs formed on one side. However, the Examiner alleges that Pall (881) does teach an extruded support layer (column 3 lines 63-66) and further teaches an extruded support layer with ribs (column 4 lines 12-14). Pall (881) states as follows "external and interior supports can be made of metal or plastic, and can be, for example, in the form of perforated sheets or plates, or woven or nonwoven or extruded netting, made of plastic filaments or extrusions". After these assertions, the Examiner concludes that It would have been obvious to one of ordinary skill to manufacture the support layer in an extruded fashion because Pall discloses several options regarding the manufacture of the second support layer including plastic, nonwoven, woven, and extruded.

Applicants respectfully disagree. Specifically, applicants have amended the independent claims to require, among other features, that the second downstream support layer comprises an extruded apertured film having ribs. Applicants respectfully submit that such feature is not disclosed by Miller et al and cannot constitute anticipation because not every element of the present independent claims is present in the Miller et al reference and an action acknowledging same is respectfully requested.

Claim Rejections – 35 U.S.C. §103

In the Office Action, the remaining claims were rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 6,136,189 to Miller et al. in view of several other U. S. Patents as follows:

> Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Miller et al. (U.S. Patent No. 5,275,743) in view of Bayerlein et al. (U.S. Patent No. 6, 153,098).
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> Miller (743) teaches a filter element (10), comprising a filtration media (22), an upstream filtration media support (21) positioned upstream from and in contact with said filtration media (22) and a multi-layer downstream filtration media support (23,24) positioned downstream from said filtration media (22), said multi-layer downstream support (23,24) including a first downstream support layer (23) and a second downstream support layer (24), wherein: said first downstream support layer (23) is in contact with said filtration media (22) and is interposed between said filtration media (22) and said second downstream layer (24). The first downstream support layer (23) is fabricated so as to minimize points of surface contact with said filtration media (22); and said second downstream support layer (24) is in contact with said first downstream support layer (23) and is fabricated so as to facilitate lateral fluid flow relative to said multi-layer downstream media support (23, 24) as recited in claim 1.
>
> Miller (743) does not teach that the filtration media is fabricated from a material selected from the group consisting of Teflon, nylon, polyaramide, polyvinylidene difluoride, polyethersulfone and combinations thereof.

However, Bayerlein (098) does teach that the filtration media can be fabricated from nylon or Teflon. It would have been obvious to one of ordinary skill in the art to fabricate the filtration media from nylon or Teflon as Bayerlein (098) teaches in column 8 lines 63 65.
Claims 8 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Miller et al. (U.S. Patent No. 5,275,743). Miller (743) teaches a resin binding composition to the filter medium as discussed in column 2 lines 52-54. Miller (743) teaches this resin binding composition as applied to a woven material; however, it would have been obvious to one of ordinary skill in the art to apply the resin binding to the matting and batting as described in claims 8 and 15 in order to enhance the structural strength of the material.

As to claim 18, it is unclear why this claim is dependent on claim 1, because claims 11 and 18 are each identifying identical matter and are both dependent on claim 1. For examination purposes claim 18 was examined as dependent on claim 13 as thought to be the original intent of the applicant.

Claims 11, 18, and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Miller et al. (U.S. Patent No. 5,275,743) in view of Pall (U.S. Patent No. 4,033,881). Miller (743) teaches a filter element (10), comprising a filtration media (22), an upstream filtration media support (21) positioned upstream from and in contact with said filtration media (22) and a multi-layer downstream filtration media support (23,24) positioned downstream from said filtration media (22), said multi-layer downstream support (23,24) including a first downstream support layer (23) and a second downstream support layer (24), wherein: said first downstream support layer (23) is in contact with said filtration media (22) and is interposed between said filtration media (22) and said second downstream layer (24). The first downstream support layer (23) is fabricated so as to minimize points of surface contact with said filtration media (22); and said second downstream support layer (24) is in contact with said first downstream support layer (23) and is fabricated so as to facilitate lateral fluid flow relative to said multi-layer downstream media support (23, 24) as recited in claim 1. As to claim 13, Miller (743 also teaches a filter cartridge comprising a filter element (10) having a longitudinal axis, an outer periphery and an inner periphery, and including a filtration media (22), an upstream filter media support (21) positioned upstream from and in contact with said filtration media (22); and a multi-layer downstream support (23,24) positioned downstream

> from said filtration media (22), said multi-layer downstream support (23,24) including a first downstream support layer (23) and a second downstream support layer (24), wherein the first downstream support layer (23) is in contact with said filtration media (22) and is interposed between said filtration media (22) and said second downstream layer (24), said first downstream support layer (23) being fabricated so as to minimize points of surface contact with said filtration media (22). The second downstream support layer (24) is in contact with said first downstream support layer (23) and is fabricated so as to facilitate lateral fluid flow relative to said multi-layer downstream filter media support (23, 24); a perforated cage (11) surrounding the outer periphery of the filter element; a perforated core (12) surrounded by the inner periphery of the filter element; and end caps (13, 14) enclosing both ends of the perforated cage (11).
>
> Miller (743) is silent as to the second downstream support layer being an extruded apertured element. Miller (743) also does not teach the extruded layer having ribs formed on one side. However, Pall (881) does teach an extruded support layer (column 3 lines 63-66) and further teaches an extruded support layer with **ribs** (column 4 lines 12-14). Pall (881) states as follows "external and interior supports can be made of metal or plastic, and can be, for example, in the form of perforated sheets or plates, or woven or nonwoven or extruded netting, made of plastic filaments or extrusions". It would have been obvious to one of ordinary skill to manufacture the support layer in an extruded fashion because Pall discloses several options regarding the manufacture of the second support layer including plastic, nonwoven, woven, and extruded. (Emphasis added)

As stated above, applicants agree with the Examiner that the original independent claims defined subject matter that was insufficient to distinguish over the primary reference, U.S. Patent No. 6,136,189 to Miller et al. as well as the primary reference cited by the European Examiner, European Patent Application Publication No. 0 470 485 A2, which substantially corresponds to U.S. Patent No. 5,552,048 to Miller et al., thought by the European Examiner to be the best available prior art. Applicants believe that the independent claims have been amended to clearly distinguish over both Miller et al. primary references, as applied both in European Patent Office and the U. S. Patent Office.

As the Examiner knows, the Examiner carries the burden under Section 103 to establish a *prima facie* case of obviousness, *In re Fine*, 837 F.2d 1071, 5 U.S.P.Q.2d 1596 (Fed. Cir. 1988), and must show that the references relied on teach or suggest all of the limitations of the claims. *In re Wilson*, 424 F.2d 1382, 1385 (C.C.P.A. 1970). "Obviousness cannot be established by combining the teachings of the prior art to produce the claimed invention, absent some teaching, suggestion or incentive supporting the combination." *Carella v. Starlight Archery*, 804 F.2d 135, 231 U.S.P.Q. 375 (Fed. Cir. 1986). There must be some explicit teaching or suggestion in the art to motivate one of ordinary skill to combine the references in the manner suggested. *See, Arkie Lures, Inc. v. Gene Larew Tackle, Inc.*, 119 F.3d 953, 957, 43 U.S.P.Q.2d 1294 (Fed. Cir. 1997). *Fromson v. Anitec Printing Plates, Inc.*, 132 F.3d 1437, 45 U.S.P.Q.2d 1269 (Fed. Cir. 1997).

In this instance, the Examiner cannot establish a *prima facie* case of obviousness and has admitted that the primary reference relied upon does not teach or suggest all of the limitations of the amended independent claims. Since the secondary references cannot make up for the deficiencies of the primary applied reference, applicants submit that all remaining claims are allowable. Accordingly, the independent claims, and each of the claims depending respectively therefrom, are not rendered obvious by the combination of Miller et al. ("743) in view of any of the applied secondary references. Therefore, withdrawal of the rejection under 35 U.S.C. §103(a) is respectfully requested for the following reasons.

Applicants make this request because apertured films are fundamentally distinct from extruded mesh materials in both their design and the processes used to manufacture them. Apertured films typically contain primary strands or ribs that run in the down web machine direction while the extruded meshes contain primary ribs or strands that only run diagonal to the down web machine direction. Apertured films are manufactured using a process similar to that used to produce biaxial oriented films while extruded mesh is manufactured using a counter-rotating die technology that places the strands in two different planes.

A further distinction between the apertured film and the extruded mesh is the greater ability of the apertured film to "nest" when folded. When a material containing a 3-dimensional structure is folded onto itself, and when

measured produces a thickness less than the sum of the 2 layers measured independently, then a "nesting" condition of the strands or ribs is taking place. The apertured film exhibits the greatest ability for the strands or ribs to "nest" due to the primary strand or rib formation running in the machine direction. This rib nesting capability allows for the maximum surface area in the filter's design. In contrast, the extruded mesh possesses a diagonal strand relative to the machine direction that, when folded in the machine direction, provides only limited "nesting" capability of the ribs.

To support this, material samples were measured for single layer thickness and folded thickness (ribs facing ribs) using a vernier caliper. Calculated % nesting was determined by the equation:

% Nesting = (2 × Single Layer Thickness – Folded Thickness) / 2 × Single Layer Thickness.

	Type	Measured Single Layer Thickness (in)	Calculated 2x Thickness (in)	Measured Folded Thickness (in)	Calculated % Nesting
Delnet RC0707-24P	Apertured Film	0.006	0.012	0.007	42%
Delnet RB0707-31P	Apertured Film	0.005	0.010	0.006	40%
Nalle N01716-90PP	Extruded Netting	0.018	0.036	0.030	17%
Nalle N01014-60PP	Extruded Netting	0.011	0.022	0.020	9%
Typar 3091L	Spunbond	0.005	0.010	0.010	0%
PTFE Membrane	Membrane	0.002	0.004	0.004	0%

Examples of the nesting capabilities of the various materials measured are shown as follows:

The European primary reference discloses that an *"Extruded polymeric mesh is generally preferable to other support and drainage materials, including woven and non-woven fibrous webs and polymeric netting, because it is so smooth..."* (See page 3, lines 39 – 40). However, claim 1 of the present application specifies *"an extruded apertured element having ribs"* and more preferably, in claim 11, an *"extruded apertured element [having] ribs on one side"*. Benefits of the apertured film are related to the importance of 'beads', 'strands', or 'ribs' nesting to maximise the filter area and thus optimise flow performance. The strands of the

apertured film, when folded upon one and other, will buckle and "misalign" (i.e. not be exactly opposed) creating the optimum nesting condition. The nested ribs which are now in a "side-by-side" fully nested configuration provide an efficient fluid pathway.

In contrast, in both the European and the U. S. primary references, careful strand or bead alignment is required: *"Care should be taken in the alignment of the support and drainage layer within the corrugator to ensure that the beads oppose themselves..."* (European primary reference, European Patent Application No. 0 470 485 A2, based upon U. S. Patent No. 5,552,048", at page 5, lines 35 to 37).

The use of an extruded mesh in either primary reference does not give the performance benefits as described in the present invention. The extruded mesh (European and U. S. primary references) and apertured film (present claims) have equivalent flux capacities; however the material thickness and "nesting capabilities of the two materials are not equivalent. The following tables demonstrate the fundamental problem with the extruded mesh material in that the amount of filter media is limited due to increased material thickness properties and decreased nesting capabilities, when used in a high area filter design as disclosed in the present application.

The following table presents the calculated effects of varying the thickness and nesting properties of the apertured film versus the extruded mesh on the individual pleat thickness of a typical cartridge construction. The pleat thickness without nesting effects can be determined by summing the thickness of the individual layers of material and multiplying by 2 to arrive at the individual folded pleat thickness (see the table, sixth column *"2 x Sum of Material Thickness"*). The pleat thickness with nesting effects can be determined by first multiplying the downstream drainage layer thickness by the appropriate nesting % and then summing the thickness of the individual layers of material and multiplying by 2 to arrive at the individual folded pleat thickness (see the table, eighth column *"Individual Pleat Thickness"*).

The following table presents the calculated effects of varying the thickness and nesting properties of the apertured film vs. the extruded mesh on the individual pleat thickness of a typical cartridge construction. The pleat thickness <u>without nesting effects</u> can be determined by summing the thickness of the individual

layers of material and multiplying by 2 to arrive at the individual folded pleat thickness (reference column "2x Sum of Material Thickness"). The pleat thickness with nesting effects can be determined by first multiplying the downstream drainage layer thickness by the appropriate nesting % and then summing the thickness of the individual layers of material and multiplying by 2 to arrive at the individual folded pleat thickness (reference column "Individual Pleat Thickness").

Filter Media Pleat Design	Upstream Support Thickness (in)	Membrane Thickness (in)	Downstream Support Thickness (in)	Downstream Drainage Thickness (in)	2x Sum of Material Thickness (in)	% Nesting of Downstream Drainage	Individual Pleat Thickness
A	0.004	0.002	0.004	0.005	0.030	40%	0.026
B	0.004	0.002	0.004	0.018	0.056	17%	0.050
C	0.004	0.002	0.004	0.010	0.040	9%	0.038

Pleat Design A: Typar 3091L/PTFE Membrane/ Typar 3091L/ **Apertured Film (Delnet RB0707-31P)**
Pleat Design B: Typar 3091L/PTFE Membrane/ Typar 3091L/ **Extruded Mesh (Nalle N01716-90PP)**
Pleat Design C: Typar 3091L/PTFE Membrane/ Typar 3091L/ **Extruded Mesh (Nalle N01014-60PP)**

Filter design A, which utilizes the apertured film, provides significantly more nesting capability than the extruded mesh materials. This additional nesting capability allows for a smaller individual pleat thickness, which provides for the greatest filter area in a cartridge.

The amount of filter media that can be packaged into a 10 inch cartridge with a centre core of outer diameter 1.73 inches and an outer cage of inner diameter of 2.646 inches can be determined in the following manner.

Pleat Pack Length = Center Core Dia x 3.14 = (1.73" x 3.14) = 5.435"
Number of Pleats per Cartridge = Pleat Pack Length / Individual Pleat Thickness = (5.435"/0.026") = 209 pleats
Effective Media Length = 2x Pleat Height x Number of Pleats per Cartridge = (2 x 0.44" x 209) = 184"
Total Effective Filter Media (10" Cart) = Effective Media Width x Effective Media Length = 9.16" x 184" = 1685 sqin.
Total Effective Filter Media in Sq Ft = 1685 sqin / 144 = 11.7 sqft

The example above utilized the pleat design A which contains the apertured film. A similar calculation can be made utilizing the extruded nets of pleat design B and C.

The following table shows 10 inch cartridge areas for both apertured film and extruded mesh constructions.

Filter Media Pleat Design	Individual Pleat Thickness	Total Pleats per Cartridge	10" Cartridge Area (sqft)	10" Cartridge Flow (gpm/psid)
A	0.026	209	11.7	4.1
B	0.050	109	6.1	2.1
C	0.038	142	8.0	2.8

Predicted product flow rates can then be determined in the following manner:

10" Cartridge Flow = 10" Cartridge Area x Filter Media Flow = (11.7 sqft x 0.35 gpm/psid/sqft) = 4.1 gpm/psid

The predicted results demonstrate the improved flow performance benefits expected of a filter design using an **apertured film** when compared to the extruded mesh.

The predicted results demonstrate the substantially improved flow performance benefits expected of a filter design using an apertured film when compared to the extruded mesh design of the prior art.

The expression 'apertured element' in claims 1 and 11 has been replaced with 'apertured film' to conform to the description, e.g. at page 11, line 9.

For the Examiner's review, applicants have attached hereto copy of the NOTIFICATION OF TRANSMITTAL OF THE INTERNATIONAL PRELIMINARY EXAMINATION REPORT for the corresponding PCT application. As the Examiner will note, according to the European Examiner at POINT V, "The closest prior art is D1 which discloses an extruded mesh material for the downstream support layer 24 having grabs (See figure 3 and accompanying description). The subject matter of claim 1 is new over D1 by providing an extruded apertured film material having ribs. As demonstrated by the applicant with comparative experiments in his letter of 01.10 .2004 an extruded apertured film material having rips (sic rips) gives a surprisingly greater ability to "nest" when folded than the extruded mesh material of D1. The advance each of the use of an extruded apertured film material having rips and conjunctions with the use of an extruded mesh material having rips as disclosed in the 1 is a higher number of pleats and thus a greater filtering surface for cartridge of the same dimension. Thus the subject matter of claim 1 and the dependent claims therefrom fulfill the requirements of Articles 33(2) and 33(3) PCT." Since there is no mention of "rips" in the application, it is apparent that the term rips

is a misspelling and that the term "ribs" is intended by the INTERNATIONAL PRELIMINARY EXAMINATION REPORT.

In view of the above action by the European Examiner based upon what is arguably a more relevant reference than the primary reference used in the present Office Action, applicants respectfully submit that all claims, claims 1-17 and 19-22, are now in condition for allowance and an action acknowledging same is respectfully requested.

If after reviewing this amendment, should the Examiner have questions, require additional information or believe that a telephonic or personal interview would resolve any remaining matters, the undersigned may be contacted at the telephone number provided below.

Respectfully submitted,

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